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ABSTRACT

Project THISTLE (Thinking Skills in Teaching and Learning) is designed to improve the basic skills of college bound urban students by working with their teachers in an integrated process of curriculum and staff development. The project's emphasis is on preparation of classroom teachers to strengthen creative, logical, and critical thinking abilities of their students, helping them to develop the interest, willingness, and ability to engage in intellectually active, constructive, and reflective encounters with ideas within the content areas. The project design involves participating teachers in three "phases" of staff/curriculum development over a period of three years or more. The three overlapping but sequential phases are: (1) graduate course work in curriculum development and basic skills instruction; (2) classroom implementation of individually prepared curriculum plans; and (3) extension activities depending upon individual personal and professional needs, strengths, and preferences. Project THISTLE was initially conceived by Montclair State College (New Jersey) faculty and planned as a cooperative higher education/local education agency venture involving the college and the Newark (New Jersey) public schools. At present, more than 100 teachers from 10 high schools and 3 elementary schools are actively engaged in Project THISTLE. (JMK)

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Project THISTLE: Thinking Skills in Teaching and Learning

A Model College-School Collaborative Program in Curriculum and Staff Development

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Paper presented to the
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Project THISTLE is a curriculum and staff development program designed to improve the pre-college preparation of urban students. The support of the Fund for New Jersey, the Victoria Foundation, the Jessie Smith Noyes Foundation, the New Jersey Board of Higher Education and Montclair State College are gratefully acknowledged.

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Project THISTLE: Thinking Skills in Teaching and Learning

A Model College-School Collaborative Program in Curriculum and Staff Development

Project THISTLE: Thinking Skills in Teaching and Learning was designed to improve the basic skills of college bound urban students by working with their teachers in an integrated process of curriculum and staff development. The major emphasis of Project THISTLE is on the preparation of classroom teachers to strengthen creative, logical and critical thinking abilities of their students, helping them to develop the interest, willingness, and ability to engage in intellectually active, constructive, and reflective encounters with ideas within the content areas.

Project THISTLE synthesizes the two processes of curriculum and staff development, and cuts across disciplines to focus on the improvement of thinking as an essential, integral part of both subject area learning and basic skills development. Underlying Project THISTLE is the belief that thinking skills are critical components of both the basic skills of reading comprehension, analytic writing, and mathematical problem solving, and successful classroom performance. Thus, it is anticipated that improvement in thinking skills will be reflected in improvement in performance both on traditional standardized tests of basic skills and in classroom activities.

The emphasis of Project THISTLE is on planning, by content area teachers, for instruction that encourages the development of thinking skills, defined as "higher-order basic skills." Few content area teachers have had training in basic skills instruction, and techniques for improving reading comprehension, expository writing, and problem solving in mathematics are typically new to them. Instruction in discussion, questioning and inquiry techniques, for instance, are welcomed by most teachers. Assistance in the development, assignment and monitoring of complex individual and small group student work, and in overcoming the inevitable student resistance to the imposition of higher standards and expectations is also of great value to teachers.

Project THISTLE, then, is an "integrated curriculum and staff program," as it provides teachers with guided instruction by college faculty in the use of curriculum resources in the planning process, instruction in the nature of higher order basic skills (or thinking skills), and guidance in the skillful orchestration of a wide range of resources--materials, strategies, activities, content, and evaluation techniques--to improve thinking skills. Teachers develop more complete, more thoughtful, more consistent versions of their own curricular plans with particular attention to the development of thinking skills, and put these plans into effect with their students, with the help and support of college faculty.

The basic design of Project THISTLE involves the participating teachers in three "phases" of staff/curriculum development over a period of three years and more. The three overlapping but sequential phases in which teachers engage

are: (1) graduate course work in curriculum development and basic skills instruction, (2) classroom implementation of individually prepared curriculum plans, and (3) extension activities depending upon individual personal and professional needs, strengths, and preferences.

At present, more than 100 Newark teachers are actively engaged in one or another of the three phases of Project THISTLE. All but a few of the 54 members of the first and second groups of teachers who successfully completed their graduate course work participate in Project THISTLE extension activities--such as workshops, seminars and committees--and/or are completing or have completed graduate course work beyond Project THISTLE toward master's degrees. Three members of the group have been appointed to supervisory positions in Newark, and one is currently teaching as an adjunct instructor at Montclair State College. A total of 13 have completed master's degrees at Montclair State College since participating in Project THISTLE.

The third group of Newark teachers, currently numbering about 20, has begun classroom implementation and the last semester of Project THISTLE course work; the fourth group of 30 teachers has just been accepted into the program.

To date, teachers from 10 Newark high schools have participated in Project THISTLE; the largest number of Project THISTLE teachers are on the faculty of Malcolm X Shabazz. Preference has been given each year to high school teachers in the academic areas; some teachers of practical arts, physical education and health, art, music, and business education have also been included. The fourth group of Project THISTLE participants will, for the first time, include upper grade elementary teachers from three schools, two of which serve as "feeder" schools for Malcolm X Shabazz, as well as some academic high school teachers. Most of the elementary teachers teach self-contained seventh and eighth grade classes.

In Figure 1, the "history" of Project THISTLE is presented, showing the progress of three separate groups of Project THISTLE teachers through the course work, guided implementation and extension phases of the program, and our plans for 1984-85.

Figure 1

Project THISTLE, 1979-1985

	79-80	80-81	81-82	82-83	83-84	84-85
THISTLE I	Phase I Graduate Coursework	Phase II Guided Imple-mentation, Formal Evaluation	Phase III Extension Activities ----------	----------	----------	----------→
THISTLE II			Phase I Graduate Coursework	Phase II Guided Imple-mentation, Formal Evaluation	Phase III Extension Activities	---------→
THISTLE III				Phase I Graduate Coursework	Phase II Guided Imple-mentation, Formal Evaluation	Phase III Extension Activities
THISTLE IV					Phase I Graduate Coursework	Phase II Guided Imple-mentation, Formal Evaluation

I. Project THISTLE as a "Model" Program

In presenting Project THISTLE as a "model" program, this paper describes the program in terms of its particular qualities as an integrated curriculum/staff development project and as a college-school collaborative project to improve pre-college preparation of urban students.

Project THISTLE as an Integrated Curriculum/Staff Development Project

Few high school teachers have had training in curriculum development, and curriculum is typically viewed as content to be covered. However, the planning that good teachers must do is by its very nature curriculum development. Curriculum guides, textbooks, and other materials can do no more than provide parameters, suggestions, and content information for teachers' planning. Teachers need greater understanding of, and skill in, the planning/curriculum development process in order to develop more effective curricular plans that focus on reflective thinking and carry out the intentions of those curricula in their classrooms. This planning process includes "interactive" and "reactive" (or "reflective") phases, as well as the "preactive" long and short range processes conventionally regarded as "curriculum development" and "teacher planning."

The greater the number of planned curricular elements a teacher can coordinate and communicate toward improving the quality of thought in the classroom, the more successful the instructional program. These elements include the selection of appropriate and challenging long range strategies (inquiry, group problem solving, etc.), related learning experiences and extended assignments, content, concern for the physical and social context of instruction, and means of evaluation.

One of the most important features of Project THISTLE is that it is a program implemented by the regular academic classroom teachers and not by specialists in a "laboratory," resource room, or other "pull-out" type of special program. In recent years, criticisms of pull-out programs such as those that had been offered through the 1970's under Title I ESEA and other compensatory education programs have finally found an audience (e.g. Stake, 1978). Fragmentation of the educational process has been the apparent result when students are removed from their classrooms to be given instruction which, in most cases, relates only remotely to ongoing classroom learning processes. Further fragmentation occurs when students are unable to reconstruct material they missed while they were attending the laboratory. In Project THISTLE, language comprehension and cognitive development are addressed simultaneously, by regular teachers within regular classrooms, through integrating both processes in teacher-developed curricular methods and materials within the content areas.

In Project THISTLE, curriculum development is defined as a comprehensive planning process involving the analysis of what is taught, why it is taught, and how it might best be taught. Teachers themselves engage in this planning process, within the prescribed curriculum guides. There is no one Project

THISTLE curriculum, although the products of teachers' work certainly contain useful ideas for their colleagues. Prepackaged curricula and curriculum guides cannot be utilized directly, nor thoughtlessly, by teachers. Each teacher must go through the process of thinking about what is taught, why, and how. Even the most up-to-date, well designed, and attractively presented curriculum guide means nothing until it is carried to reality by the teacher in a classroom. Working with teachers in developing the skills needed to do so effectively and providing the needed support is a critical part of Project THISTLE. In a very real sense, then, each teacher *is* the project itself, because the project is real only to the extent that each teacher understands the ideas, adapts them for his/her use, and carries them into the classroom. It is in this sense that Project THISTLE is an integrated staff development/curriculum development project--teachers are "trained" in the curriculum development process.

Elbaz (1981) states that a teacher should be viewed as a "central and autonomous figure within a deliberative curriculum context" (p. 44), not as a "passive transmitter" of curricular knowledge into instructional practice, destined to be blamed for all failure in transmission of educational intentions into measurable student achievement. As a central and autonomous figure, a teacher is a thinking, decision making, problem solving, responsible person. Respecting the teacher's responsibilities for planning "within a deliberate curriculum context" highlights the importance of the teacher's involvement in the planning process and places, appropriately, critical emphasis on teachers' *thinking* about curriculum.

The process of teacher planning, long neglected by educational researchers, has in recent years begun to attract systematic investigation. Teacher planning is conceptualized as a subset of teachers' thinking about the work they are to do--thinking in the "future tense"--and involves teachers' beliefs about the nature and purposes of education in general and their expectations and conceptions regarding their own and their students' ability to achieve meaningful educational goals (Clark and Yinger, 1977, 1980; Elbaz, 1981; Goodlad, 1983).

Essentially, teacher planning involves the decisions that teachers make within their problem spaces--within their subjective understanding of what education is supposed to be like and what they and their students are supposed to (or might be able to) accomplish. Eisner (1979) indicates that "teachers engage in such planning most of the time, and to do so is to make curriculum decisions, to engage in a form of *personal curriculum deliberation*" (p. 110). Teacher planning is the vehicle through which curriculum is acted upon (Clark, 1983), the vehicle through which it is transferred into action.

Teachers plan in accordance with their "practical knowledge" of subject matter content, curricular specifications for the particular grade or course, instruction, self and the milieu of schooling (Elbaz, p. 48). This practical knowledge is composed of rules, practical principles, and images, defined by Elbaz (p. 48) as "intuitive knowledge based on experience, theoretical knowledge, and school folklore." Practical knowledge guides the teacher through the processes of preactive planning (planning that occurs before instruction) and interactive planning (planning that occurs while teaching), toward the realization of curricular intentions.

Teacher planning, conceptualized as curriculum deliberation, is thus a

central pivotal aspect of curriculum development. Helping teachers through staff development to broaden and share with each other their understanding of this process--to expand their problem spaces; to inform their practical knowledge of curriculum, of themselves as teachers, and of the context of schooling --is a major component of Project THISTLE.

When curriculum is viewed as planning for instruction, basic skills are defined as thinking skills, and teachers understand the relationship between these skills and content learning, they more often design or select objectives and activities to help students understand the information and relate it to other aspects of their knowledge of the world. They are more likely, by doing so, to stimulate curiosity and motivation, attention and elaboration--so that students ultimately learn to take a more active role in attaining their own education.

Project THISTLE as a College-School Collaborative Program

Project THISTLE was initially conceived by Montclair State College faculty and planned as a cooperative higher education/local education agency venture involving Montclair State College and the Newark public schools.

Models of the educational change process had been examined prior to introducing the program to Newark school personnel, and change strategies were adopted. These strategies included securing and maintaining the cooperation of administrators and supervisors, avoiding domination of the program by college faculty, implementing extensive follow-up activities, and providing professional and personal incentives. In planning strategies to assure program success, attention was given to the concepts of relative advantage, compatibility, and divisibility. These change strategies are described below.

Consideration and implementation of change strategies. Beginning in the early 1960's, a number of descriptive and prescriptive works with a focus on the process of change in public schools began to appear. Many of these works included "models" intended to guide the change process. However, most innovations undertaken in schools since these models emerged have been undertaken either in ignorance or defiance of the models. One of the reasons for this tendency was identified in one of the early important works on change. Miller (1967) suggested that the myth upon which educators tend to operate is that "a good product will succeed on its own" (p. 17). An extension of this idea is the myopic presumption of inventors that their "new" idea is so obviously wonderful and likely to revolutionize the schools that the mere mention of the idea to educators will send them running in a frenzied state to the nearest classroom to begin the faithful implementation of the idea. A related problem is that innovators tend to be so close to the idea that they fail to recognize that it may be difficult for another to understand. Their investment in the idea often causes them to view resistance as though it were treason.

We began this project with no such illusions. Cognizant of the power of some of the models imbedded in the literature, we began by examining these models, projecting potential difficulties, and defining change strategies needed to overcome the difficulties.

Securing the cooperation of key district administrators. We began with the assumption that key district administrative personnel--including the superintendent, the associate superintendent, the assistant superintendent for secondary schools, the principals and vice principals in target schools, and the affected department chairs--must be involved and informed about the project from its inception. Despite the tendency of central office administrators to be isolated from teachers, their views and support for programs are important. Along with principals and department chairs, they play a role as opinion leaders in the district.

Particular attention was paid to the school principals. It is widely recognized that the principal is very often a key to the success of an innovation in the school. There appears to be a direct relationship between the extent to which the principal is informed and involved in the project and the extent to which teachers take the time to implement the suggestion. The role of department chairs in a district such as Newark is particularly critical as well. They are full-time administrators, with no teaching responsibilities.

A concerted effort was made to meet with each of the key opinion leaders in the districts and to be certain that they had a clear understanding of the nature and intent of the project and of the expectations we had for them. The first meeting was held with the Assistant Executive Superintendent for Secondary Schools. He was asked to help identify the schools for the project. Considerable time was spent in discussing the ideas of the project with him. At his suggestion, he made the initial contact with the school principals to inform them that representatives of the project would be calling to discuss the idea with them.

Once the target schools were identified, meetings were held with each of the principals of these schools as well as with the vice principals, where appropriate. The precise nature of the project was explained and the expectations that we held for the participants in the project were made clear. This series of meetings with the key administrators in the schools and in the district represented a tremendous investment of time on the part of project personnel. The net effect was that these individuals had a sense of what our expectations were for project participants. It is well known that an administrator can encourage teacher participation in an innovative idea, or discourage it by a mere shrug of the shoulder. Our feeling was that if the principals and others understood the nature of the project, they would be more likely to support it. That seemed to be the case in the course of the project.

One additional strategy was employed in gaining the support of the superintendent. The School of Professional Studies (called at that time the School of Educational and Community Services) publishes a journal entitled *The Montclair Education Review* twice a year. In the course of meeting with the superintendent of schools, it was suggested that one issue of this journal be devoted to highlighting the positive aspects of school programs in Newark. This suggestion was greeted with considerable enthusiasm. A number of copies of the issue were eventually provided to the Public Relations Office of the school district for their use, as well as distributed throughout New Jersey.

The need to insure cooperation on the Montclair State College campus was also considered. Meetings were held to explain the project, to ensure under-

standing and cooperation across disciplines and departments (faculty were drawn from the departments of Educational Leadership--including the divisions of Research, Reading, and Administration and Supervision--and the departments of English/Writing and Mathematics), and to coordinate with administrative offices and the Office of Basic Skills, which deals with college remedial services at Montclair State College. The project was presented at a meeting of the Newark Board of Education and at a meeting of the Montclair State College Board of Trustees prior to initiation of the project; project personnel were present for both these presentations. During the course of the project, a series of three issues of *The Montclair Education Review* called "Liberal Education in a Back-to-Basics World" was published. This series presented a dialogue between college and school on the issues addressed by the project. Participating college faculty and Newark school teachers contributed to the series, which helped everyone to understand the issues involved in precollege preparation.

Prevention of domination of the project by the higher education unit. History of curricular innovation is replete with examples of incidents where higher education personnel discounted the ability and the role of individuals in local educational agencies. The numerous efforts to produce teacher-proof curricula throughout the 1960's are good examples of this. It was our view that any project with a chance of success, in an urban setting in particular, had to be based upon a genuinely cooperative relationship.

The view that Project THISTLE would be a cooperative venture, whatever the product would be, permeated all of the courses that were a part of this program. There was no suggestion that the college faculty had the "answers" and were in a position to transmit those answers to the teachers. In every instance they chose to work within the existing curricular guide rather than suggesting that it be replaced. The basic skills courses provided a framework for teachers to examine the existing curricula and to infuse into those curricula new approaches based upon what had been learned in Project THISTLE.

Teachers were encouraged to consider every opportunity to structure learning experiences which would generate creative and/or critical thinking. The materials to be used by a particular classroom teacher were generated primarily by that teacher, with the help and guidance of college faculty and peers. The idea that it was the classroom teacher who best understood the needs and capabilities of the students was emphasized continually. The imposition of impractical demands and the suggestion that existing practices be scrapped was avoided. Teachers were asked to examine what they were doing and, from what they had learned, to try to build new activities that would advance the idea of critical thinking. A number of opportunities for micro-teaching and videotaping were incorporated within the project, with peers providing analysis and insight as much as college faculty.

The net result of this sort of change strategy was, of course, that it does not produce a single unified product that meets the standard expectations for dissemination. There is no one Project THISTLE curriculum, and certainly it is not our view that these curriculum products can themselves be transferred directly to another district. The project focused on the process of having teachers rethink their instructional techniques and curricula with the objective of increasing opportunity for student thinking. It was the involvement

in this cooperative process that was the essence of the project. In a sense, each of the teachers involved developed more advanced approaches and produced individual sets of curriculum materials that they could use in their classes. This is not to suggest that there are not many elements of those products that might be diffused, but the readiness of others to accept these ideas in their classes is assumed to depend upon their participation in the process of analyzing what they have been doing in light of what they might have been doing.

Needless to say, in many ways this process represented a new role for college faculty. Faculty working in Project THISTLE were very careful to avoid being prescriptive in their approach to instruction. It is our sense that this experience has led to some changes in the approach to instruction that the faculty members take in other courses they teach.

Parties and other informal social interactions were also arranged; the emphasis was on developing collegial relationships between college and school faculties.

Provision of adequate follow-up. Very often, innovations are developed up to the point at which they are to be implemented. Examination of some of the early literature on change, including Rogers' work, suggests that the change process really was viewed and considered only up to the point of adoption. In fact, in Rogers' model, drawn from the diffusion of innovation, we find the suggestion that after adoption, there are a number of additional results that might occur. There is the decision to adopt (followed by later adoption or continued rejection). Later adaptations of Rogers' work, particularly the work of Havelock, add another stage to the process. This is the stage of nurturing, the critical stage after the decision to adopt has been made and during which the innovation is actually implemented.

From its inception, Project THISTLE recognized that the support teachers needed at the time they began to implement the ideas of the project was the most critical phase of the project. Much of the early work in assuring teachers that opinion leaders in the school understood the project was intended to provide support for the teachers during the time of implementation. This proved, in many cases, to work. We have numerous reports from project participants regarding the support given them by individual department chairs and by other school officials. There were, of course, instances where this support was not forthcoming; where that became a clear problem, additional efforts were undertaken by project staff to work with the supervisors involved.

An additional aspect of "nurturing" involved the assignment of college faculty to visit the classes of THISTLE teachers and work with them in that setting. Provision was made in the second year of the project (the first time that teachers were expected to implement elements of the project in their own classes) to provide for such follow-up and support visits. In addition to visits by the college faculty and by the project director, teachers were encouraged to visit each other's classes. We found that this did occur in a number of instances.

During the implementation phase of the project, a series of seminars was scheduled to focus primarily on problems encountered in the classroom. In many respects, these seminars represented the formation of support groups for faculty of the particular schools. Teachers knew that as they encountered problems they

could turn to the other faculty in their schools to gain support and help in solving those problems.

Individual faculties of the high schools were also asked to elect a Project THISTLE teacher as project coordinator for that particular school. The responsibilities of this person included providing help, when needed, to other Project THISTLE teachers. In addition, these individuals would serve to transmit concerns to the college faculty so that individual teachers would not face the problem of being unable to reach someone when help was really needed. It is our view that even more follow-up and support would have been desirable. The level provided was based upon the level of funding for the project. We believe that this support effort--this nurturing at the time of implementation--is one of the most important aspects of curricular innovation.

Providing adequate incentives for participants. As suggested earlier, proponents of change often approach the change process with the expectation that the innovation will sell itself. They often fail to recognize that individual teachers may have a different perception of priorities, both professional and personal.

In the context of professional priorities, Rogers has identified several important characteristics of innovations which have an effect on the likelihood of adoption. Those which provided us with considerable guidance in planning this project were "relative advantage," "compatibility," and "divisibility." Relative advantage is the extent to which the teacher is likely to see the effort as "worth it" in terms of educational advantage. Is it likely that the result of work on the innovation will be better education? Is the result likely to be so much better that it is worth putting in the work required? Compatibility is the degree to which the innovation appears to be consistent with existing norms and values in the system. Divisibility is the extent to which the innovation can be tried in part rather than being adopted by all teachers, systematically displacing all other instruction. We made an effort to consider the innovation and plan strategies in light of these characteristics.

Regarding personal priorities, teachers in the 1980's can no longer be expected to undertake major innovations, including extensive training, without tangible personal rewards. This may be most true in a setting such as Newark. In any event, we entered into the project with the view that a reward system beyond the intrinsic, professional rewards had to be clear for those who would participate.

In the case of the goals of Project THISTLE, the issue of relative advantage was not difficult to establish. Who could argue against the focus of education being to increase the creativity and critical thinking abilities of students? Continual emphasis was placed on the fact that our ideas were not "new." We did, of course, put considerable effort into establishing that this goal was achievable. One of the prime sources used in establishing the credibility of the goal was John Dewey's *How We Think*. The teachers in the project analyzed this work in depth, always thinking in the context of implications for their own classes.

A related issue was the connection between "thinking" and basic skills as traditionally defined. We reasoned that if teachers accepted the development

of thinking skills as likely to have an impact on traditional basic skills as measured by standardized tests, then the relative advantage issue would work in our favor. In one of the earliest courses, teachers engaged in a content analysis of standardized reading tests. Through this process we established the premise that, for the most part, such tests measure thinking and analytic skills as much as simple decoding skills, and that the latter was a necessary but not sufficient goal if we were to improve student performance on such measures.

Regarding the issue of compatibility, much of our work with district administrators addressed this concern. It is only when the values of the teachers and the district are compatible that change will occur. Once the support of the administrators was made clear, there was little difficulty with the compatibility issue.

Divisibility was addressed by pointing out to the participants that we were not seeking to replace the existing curriculum, that they could attend to the issues raised in THISTLE as much or as little as their final perceptions of the worth of the activities dictated, and that their work was not dependent upon what other teachers did in earlier grades. Of course we hoped that the ideas would be used frequently and that there would be a cumulative effect in the case of students exposed to several Project THISTLE teachers; it was our view that teachers needed to understand that they were not making a commitment to total change at the outset and that if they decided later not to use the activities developed, this would have limited effect on others who chose to use them.

Several administrators and supervisors indicated that what we were proposing was not only one way to improve instruction, but the "*only* way," referring to planning as curriculum development and basic skills as thinking skills.

A number of personal incentives were provided to participants. Among these were the opportunity to earn eighteen graduate credits at no cost in the course of the project (Newark credits graduate courses for salary increments), the possibility of applying eighteen credits toward a master's degree, and a stipend for summer work. The fact that we easily recruited teachers for the project suggests that these incentives are adequate.

II. Goals, Objectives, and Evaluation of Student Progress

Project THISTLE has been described as a secondary/post-secondary collaborative program to improve the basic skills of urban college bound students. Its major goal is to improve the opportunity for success in post-secondary education of students currently in high school. Within its conception of teacher planning as curriculum development and of basic skills as thinking skills to be developed through content instruction, let us look at the objectives which guide program activities through the three project phases.

Phase I is devoted mainly to graduate course work for teachers in curriculum development and in basic skills instruction. Stated formally, its objectives are that teachers will develop understanding of:

a. the role of teacher planning in curriculum and teaching.
b. the nature of thinking skills.
c. questioning techniques and other strategies to elicit student thinking.
d. continuity and expectation, and how to develop achievement motivation.
e. developing basic skills through content area instruction.

In Phase II, teachers implement the program with their students, with the guidance and support of their college instructors, colleagues, and school supervisors. Through the use of individually planned curriculum units which incorporate the development of thinking skills within content instruction, it is expected that teachers will have developed in their abilities to:

a. plan and conduct lessons which focus upon fundamental ideas and concepts, selecting content, strategies, materials, activities, assignments and evaluation techniques appropriate to curricular goals and objectives (teacher planning as curriculum development).
b. establish learning environments conducive to reflective thinking, in which teachers and students build upon each others' contributions and relate content information to prior knowledge and experience and to other aspects of school learning (nature of reflective thinking).
c. ask higher order questions and probe to elicit and clarify thinking; listen, redirect, facilitate discussion of issues, model reflective thinking when appropriate, provide many opportunities for students to engage in a variety of thinking activities and assignments.
d. provide continuity through ongoing assignments and activities within units; encourage active, responsible student behavior, including class participation, regular attendance and completion of work; make efficient use of the classroom time of both teachers and students (continuity and expectation).
e. use appropriate techniques to improve reading comprehension, analytic writing and mathematical problem solving within content instruction; use and clarify methods of inquiry appropriate to particular disciplines; analyze complex ideas in terms of components and parallel structures in prior experience (basic skills in content instruction).

Phase II also involves an evaluation of the effects of Project THISTLE on students. Formal student objectives are that, through the efforts of their

teachers, students will demonstrate:

a. improved reading comprehension as measured by standardized tests.
b. increased achievement motivation as measured by improved general acceptance of responsibility for learning (e.g. goal setting, class participation, completion of assignments, attendance).
c. improved ability to sustain engagement in challenging higher order thinking activities (e.g. reflective discussion and analysis, reading for comprehension, writing, etc.).
d. increased spontaneous use of reflective thinking to question, relate ideas, examine problems from multiple perspectives, etc.

Phase III, the part of the program devoted to extension activities, was designed to continue development in the objectives listed for Phases I and II on the part of teachers and students, and to provide for support to others in implementing the program. Project THISTLE participants were to join with administrators and supervisors in developing:

a. an increased understanding of the principles and objectives of Project THISTLE.
b. an increased understanding of their role in providing support for teachers implementing the program.
c. an increased willingness and ability to participate in planning and offering extension activities (workshops, etc.) within their schools.

Evaluation of Student Progress

As part of the evaluation of Project THISTLE, the standardized test scores in reading comprehension of students of the project's participating teachers have been analyzed during Phase II.

Reading comprehension tests as measures of thinking skills. In deciding to use the standardized tests of reading comprehension as the student outcome measure of the attainment of student objectives in terms of academic achievement, some important assumptions were made. First, it was assumed that there were no available tests specifically designed to measure the scope of thinking abilities developed in Project THISTLE which were within the ability of the average student in the program; such tests as the Watson-Glaser Test of Critical Thinking were deemed too difficult and too narrowly focused for effective use. Second, it was assumed that tests of reading comprehension do, in fact, measure cognitive skills; on the high school level, they represent a measure of the application of intellectual skills--thinking skills--to general content area tasks. And third, it was assumed that problems that students have in making inferences, drawing conclusions, reasoning, analyzing problems, considering various perspectives, taking alternative positions on issues, and organizing and expressing ideas would be reflected in--if not measured directly by--tests of reading comprehension, and result in impaired performance on these tests.

Content analyses of secondary school level standardized test items in the basic skills and content areas reveal that it would be extremely difficult to

distinguish among items selected from tests designed to measure achievement in reading comprehension, science, or social studies. Tests of mathematics concepts generally are distinguishable by the use of numbers; however, even in such tests, the prerequisite arithmetic skills are extremely simple and items testing mathematical concepts are, in part, measures of verbal comprehension skills. In one widely used test series, the prose passages used as stimuli on the reading comprehension subtest *all* deal with science and social studies content; many prose passages within the science and social studies achievement subtests parallel reading comprehension items and some, indeed, might equally well appear in tests of reading comprehension.

Statistical analyses of such tests, too, reveal that an underlying verbal comprehension factor explains much variance in test performance. It was hypothesized that the development of skills in language and cognitive comprehension--in creative, logical and critical thinking--would improve such performance.

The particular test used as a measure of reading comprehension was the Comprehensive Test of Basic Skills (CTBS), administered on an annual basis by the Newark school system. In keeping with our general principle that the ongoing processes of the school were to be respected, it was decided to use the available test scores rather than imposing our own testing program.

Analyses of Student Achievement Data

At the completion of Phase II, pretest and posttest standardized test scores in reading comprehension were recorded for tenth, eleventh, and twelfth grade students of the project's participating teachers. These data were collected in 1981 for students of THISTLE I teachers; scores on the reading comprehension subtest of the CTBS administered in April, 1980 were used as pretest, and those on the CTBS administered in April, 1981 served as posttest. Parallel data were collected in 1983 for students of THISTLE II teachers; 1982 and 1983 test scores were used as pre- and posttests, respectively. Follow-up data were also collected in 1983; data were recorded for THISTLE I teachers' students who were still in high school and who were tested in 1982 and 1983.

Pretest-posttest comparisons. Historical regression analyses were employed for each pretest-posttest comparison. This analysis involves the assumption that the average rate of growth for a group would be expected to remain constant unless Project THISTLE (or some other special project) was indeed effective in improving student achievement. A predicted rate of growth was calculated for each student, based on the student's prior average rate of growth in reading comprehension over the years he or she had been in school at the time of pretest; it is based on his or her grade level in school and pretest score in grade equivalents. The predicted rate of growth was then used to estimate a predicted posttest score for each student. The average predicted and actual posttest scores were then compared statistically, using correlated *t*-tests of the significance of the difference between means.

Table 1 presents the means of the pretest scores, predicted rates of growth (gain), predicted posttests, actual gains, and actual posttest scores for students of THISTLE I (1980-81) and THISTLE II (1982-83) teachers.

Table 1

Student Improvement in Reading Comprehension
Dur g Project THISTLE Participation

Grade Level	N	Pretest Mean	Pretest SD	Pred. Gain	Pred. Posttest	Actual Gain	Posttest Mean	Posttest SD
				1980-81 Analysis				
10	149	7.80	1.60	.69	8.49	1.29	9.09	2.01
11	174	7.49	2.14	.60	8.09	1.30	8.79	2.48
12	155	7.58	2.03	.56	8.14	.92	8.50	2.48
Total	478	7.62	1.96	.61	8.23	1.17	8.79	2.36
				1982-83 Analysis				
10	122	7.32	2.14	.65	7.97	1.84	9.16	1.75
11	69	8.09	2.05	.66	8.75	1.61	9.70	1.81
12	21	8.04	2.19	.60	9.39	1.35	9.39	2.59
Total	212	7.64	2.14	.64	8.28	1.72	9.36	1.88

The t-tests of the significance of the difference between mean predicted and actual posttest scores were 17.51 ($p < .001$) for the 1980-81 data and 7.60 ($p < .001$) for the 1982-83 data. Within the limitations of this type of single group statistical design, it was concluded that Project THISTLE has been successful in raising students' reading comprehension over the period of their participation. The replication of the data analysis, with the same results, lends strong support to this conclusion.

Follow-up data analyses. In 1983, data were collected for students who had served as tenth grade "subjects" in the earlier 1980-81 pretest-posttest analysis of their reading comprehension scores. Full sets of scores for a total of 77 of the original 149 students (52%) were located. The progress of these Project THISTLE students from ninth through twelfth grade is presented in Table 2 for each of the three participating schools. The mean scores for each of these schools is also presented, for purpose of comparison.

Table 2

Follow Up Mean Scores in Reading Comprehension
1980-81 Grade 10 Project THISTLE Participants

	N	School A	School B	School C	Total
Grade 9 (1980)					
School		5.9	5.6	6.0	
THISTLE	23	7.65	7.97	7.76	7.76
Grade 10 (1981)					
School		6.7	5.9	6.9	
THISTLE	13	8.56	9.29	8.76	8.79
Grade 11 (1982)					
School		7.4	6.8	7.9	
THISTLE	41	9.53	9.76	9.44	9.52
Grade 12 (1983)					
School		9.4	9.3	9.5	
THISTLE	77	10.99	10.10	11.05	10.87

The data presented in Table 2 indicate that Project THISTLE students, on the average, achieved and maintained a normal rate of growth through their high school years. Although they completed their studies below grade level, on the average, they were substantially ahead of the average student in their schools.

III. Summary

Project THISTLE: Thinking Skills in Teaching and Learning was designed to improve the basic skills of college bound urban students by working with their teachers in an integrated process of curriculum and staff development. The major emphasis of Project THISTLE is on the preparation of classroom teachers to strengthen creative, logical and critical thinking abilities of their students, helping them to develop the interest, willingness, and ability to engage in intellectually active, constructive, and reflective encounters with ideas within the content areas.

Project THISTLE synthesizes the two processes of curriculum and staff development, and cuts across disciplines to focus on the improvement of thinking as an essential, integral part of both subject area learning and basic skills development. Underlying Project THISTLE is the belief that thinking skills are critical components of both the basic skills of reading comprehension, analytic writing, and mathematical problem solving, and successful classroom performance. Thus, it is anticipated that improvement in thinking skills will be reflected in improvement in performance both on traditional standardized tests of basic skills and in classroom activities.

The basic design of Project THISTLE involves the participating teachers in three "phases" of staff/curriculum development over a period of three years and more. The three overlapping but sequential phases in which teachers engage are: (1) graduate course work in curriculum development and basic skills instruction, (2) classroom implementation of individually prepared curriculum plans, and (3) extension activities depending upon individual personal and professional needs, strengths, and preferences. At present, more than 100 teachers from 10 high schools and three elementary schools are actively engaged in Project THISTLE.

Project THISTLE is an "integrated curriculum and staff program" as it provides teachers with guided instruction by college faculty in the use of curriculum resources in the planning process, instruction in the nature of higher order basic skills (or thinking skills), and guidance in the skillful orchestration of a wide range of resources--materials, strategies, activities, content, and evaluation techniques--to improve thinking skills. Teachers develop more complete, more thoughtful, more consistent versions of their own curricular plans with particular attention to the development of thinking skills, and put these plans into effect with their students, with the help and support of college faculty.

Project THISTLE was initially conceived by Montclair State College faculty and planned as a cooperative higher education/local education agency venture involving Montclair State College and the Newark public schools.

Models of the educational change process had been examined prior to introducing the program to Newark school personnel, and change strategies were adopted. These strategies included securing and maintaining the cooperation of administrators and supervisors, avoiding domination of the program by

college faculty, implementing extensive follow-up activities, and providing professional and personal incentives. In planning strategies to assure program success, attention was given to the concepts of relative advantage, compatibility, and divisibility.

Evaluation data indicate that Project THISTLE students, on the average, achieved and maintained a normal rate of growth through their high school years. Although they completed their studies below grade level, on the average, they were substantially ahead of the average student in their schools.

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